

WHAT IS CLAIMED IS:

1. A header compression apparatus for compressing a header of a packet to be transmitted by referring to reference information that is also included in a receiving side, said apparatus comprising:

5 reference information management means for storing and managing said reference information;

packet compression means for compressing the header of the packet in a specified operation mode by referring to said reference information, and selectively adding, to the compressed 10 packet, update information for updating the reference information at the receiving side;

packet transmission means for transmitting the packet compressed by said packet compression means;

15 packet receiving means for receiving an ACK packet indicating that the reference information at the receiving side has been correctly updated or a NACK packet for requesting transmission of said update information due to a header decompression error that occurred at the receiving side; and

20 mode determination means for switching the operation mode of said packet compression means to a reliable mode where, after the reference information of the header compression apparatus is updated, said packet compression means continuously adds said update information until the ACK packet is received,

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and to an optimistic mode where said packet compression means adds
25 said update information when the reference information of the
header compression apparatus is updated and whenever receiving
the NACK packet, wherein

when said operation mode is the optimistic mode and the
number of NACK packets received by a unit time X is larger than
30 a predetermined value Y , said mode determination means switches
said operation mode to the reliable mode, and when said operation
mode is the reliable mode and the number of ACK packets received
by the unit time X is larger than a predetermined value Z , said
mode determination means switches said operation mode to the
35 optimistic mode.

2. The header compression apparatus according to claim
1, wherein

said mode determination means calculates a rate of
change in the number of NACK packets or ACK packets received by
5 the unit time X , and increases the unit time X when said rate of
change is smaller than a predetermined value A , and decreases the
unit time X when said rate of change is larger than a predetermined
value B .

3. A header decompression apparatus for decompressing
a header of a received packet by referring to reference
information that is also included in a transmitting side, said

apparatus comprising:

5 reference information management means for storing and managing said reference information;

packet receiving means for receiving the packet with update information selectively added thereto for updating said reference information;

10 packet decompression means, provided with the packet received by said packet receiving means, for updating said reference information by using said update information, and decompressing the header of the packet by referring to said reference information;

15 packet transmission means for transmitting an ACK packet indicating that said reference information has been correctly updated or a NACK packet for requesting transmission of said update information when a header decompression error occurs in said packet decompression means;

20 mode determination means for switching the operation mode of the transmitting side to a reliable mode where, after updating the reference information of the transmitting side, the transmitting side continuously adds said update information until receiving the ACK packet, and to an optimistic mode where the 25 transmitting side adds said update information when the reference information of the transmitting side is updated and whenever receiving the NACK packet; and

mode notification means for notifying the transmitting

side of said operation mode selected by said mode determination
30 means, wherein

35 said mode determination means counts the number of header decompression errors that occurred by a unit time X in said packet decompression means, and, when said operation mode is the optimistic mode and said number is larger than a predetermined value Y , said mode determination means switches said operation mode to the reliable mode, and when said operation mode is the reliable mode and said number is smaller than a predetermined value Z , said mode determination means switches said operation mode to the optimistic mode.

4. The header decompression apparatus according to claim 3, wherein

5 said mode determination means calculates a rate of change in said number by the unit time X , and increases the unit time X when said rate of change is smaller than a predetermined value A , and decreases the unit time X when said rate of change is larger than a predetermined value B .

5 5. A header compression apparatus for compressing a header of a packet to be transmitted by referring to reference information that is also included in a receiving side, said apparatus comprising:

reference information management means for storing and

managing said reference information;

packet compression means for compressing the header of the packet in a specified operation mode by referring to said reference information, and selectively adding, to the compressed packet, update information for updating the reference information at the receiving side;

packet transmission means for transmitting the packet compressed by said packet compression means;

packet receiving means for receiving an ACK packet indicating that the reference information at the receiving side has been correctly updated or a NACK packet for requesting transmission of said update information due to a header decompression error that occurred at the receiving side;

delay time measuring means for measuring a roundtrip delay time with respect to the receiving side by transmitting and receiving a packet to and from the receiving side; and

mode determination means for switching the operation mode of said packet compression means to a reliable mode where, after the reference information of the header compression apparatus is updated, said packet compression means continuously adds said update information until the ACK packet is received, and an optimistic mode where said packet compression means adds said update information when the reference information of the transmitting side is updated and whenever receiving the NACK packet, wherein

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said mode determination means receives, by a unit time
X, said roundtrip delay time from said delay time measuring means,
and switches said operation mode to the reliable mode when said
operation mode is the optimistic mode and said roundtrip delay
35 time is smaller than a predetermined value Y, and to the optimistic
mode when said operation mode is the reliable mode and said
roundtrip delay time is larger than a predetermined value Z.

6. The header compression apparatus according to claim
5, wherein

5 said mode determination means calculates a rate of
change in said roundtrip delay time, and increases the unit time
X when said rate of change is smaller than a predetermined value
A, and decreases the unit time X when said rate of change is larger
than a predetermined value B.

7. A header decompression apparatus for decompressing
a header of a received packet by referring to reference
information that is also included in a transmitting side, said
apparatus comprising:

5 reference information management means for storing and
managing said reference information;

packet receiving means for receiving the packet with
update information selectively added thereto for updating said
reference information;

10 packet decompression means, provided with the packet received by said packet receiving means, for updating said reference information by using said update information, and decompressing the header of the packet by referring to said reference information;

15 packet transmission means for transmitting an ACK packet indicating that said reference information has been correctly updated or a NACK packet for requesting transmission of said update information when a header decompression error occurs in said packet decompression means;

20 delay time measuring means for measuring a roundtrip delay time with respect to the transmitting side by transmitting and receiving a packet to and from the transmitting side;

 mode determination means for switching the operation mode of the transmitting side to a reliable mode where, after 25 updating the reference information of the transmitting side, the transmitting side continuously adds said update information until receiving the ACK packet, and to an optimistic mode where the transmitting side adds said update information when the reference information of the transmitting side is updated and whenever 30 receiving the NACK packet; and

 mode notification means for notifying the transmitting side of said operation mode selected by said mode determination means, wherein

 said mode determination means receives, by a unit time

35 X , said roundtrip delay time from said delay time measuring means,
and switches said operation mode to the reliable mode when said
operation mode is the optimistic mode and said roundtrip delay
time is smaller than a predetermined value Y , and to the optimistic
mode when said operation mode is the reliable mode and said
40 roundtrip delay time is larger than a predetermined value Z .

8. The header decompression apparatus according to
claim 7, wherein

5 said mode determination means calculates a rate of
change in said roundtrip delay time measured by the unit time X ,
and increases the unit time X when said rate of change is smaller
than a predetermined value A , and decreases the unit time X when
said rate of change is larger than a predetermined value B .

9. A header compression method of compressing a header
of a packet to be transmitted by referring to reference
information that is also included in a receiving side, said method
comprising:

5 a packet compression step of compressing the header of
the packet in a specified operation mode by referring to said
reference information stored, and selectively adding, to the
compressed packet, update information for updating the reference
information at the receiving side;

10 a packet transmission step of transmitting the packet

compressed in said packet compression step;

15 a packet receiving step of receiving an ACK packet indicating that the reference information at the receiving side has been correctly updated or a NACK packet for requesting transmission of said update information due to a header decompression error that occurred at the receiving side; and

20 a mode determination step of switching the operation mode of said packet compression step to a reliable mode where, after said reference information is updated, said update information is continuously added until the ACK packet is received, and to an optimistic mode where said update information is added when said reference information is updated and whenever the NACK packet is received, wherein

25 in said mode determination step, when said operation mode is the optimistic mode and the number of NACK packets received by a unit time X is larger than a predetermined value Y , said operation mode is switched to the reliable mode, and when said operation mode is the reliable mode and the number of ACK packets received by the unit time X is larger than a predetermined value 30 Z , said operation mode is switched to the optimistic mode.

10. The header compression method according to claim 9, wherein

in said mode determination step, a rate of change in the number of NACK packets or ACK packets received by the unit

5 time X is calculated, and the unit time X is increased when said rate of change is smaller than a predetermined value A , and decreased when said rate of change is larger than a predetermined value B .

11. A header decompression method of decompressing a header of a received packet by referring to reference information that is also included in a transmitting side, said method comprising:

5 a packet receiving step of receiving the packet with update information selectively added thereto for updating said reference information stored;

10 a packet decompression step, provided with the packet received in said packet receiving step, for updating said reference information by using said update information, and decompressing the header of the packet by referring to said reference information;

15 a packet transmission step of transmitting an ACK packet indicating that said reference information has been correctly updated or a NACK packet for requesting transmission of said update information when a header decompression error occurs in said packet decompression step;

20 a mode determination step of switching the operation mode of the transmitting side to a reliable mode where, after updating the reference information of the transmitting side, the

transmitting side continuously adds said update information until receiving the ACK packet, and to an optimistic mode where the transmitting side adds said update information when the reference information of the transmitting side is updated and whenever 25 receiving the NACK packet; and

a mode notification step of notifying the transmitting side of said operation mode selected in said mode determination step, wherein

in said mode determination step, the number of header 30 decompression errors that occurred by a unit time X in said packet decompression step is counted and, when said operation mode is the optimistic mode and said number is larger than a predetermined value Y , said operation mode is switched to the reliable mode, and when said operation mode is the reliable mode and said number 35 is smaller than a predetermined value Z , said operation mode is switched to the optimistic mode.

12. The header decompression method according to claim 11, wherein

in said mode determination step, a rate of change in said number by the unit time X is calculated, and the unit time 5 X is increased when said rate of change is smaller than a predetermined value A , and decreased when said rate of change is larger than a predetermined value B .

13. A header compression method of compressing a header of a packet to be transmitted by referring to reference information that is also included in a receiving side, said method comprising:

5 a packet compression step of compressing the header of the packet in a specified operation mode by referring to said reference information stored, and selectively adding, to the compressed packet, update information for updating the reference information at the receiving side;

10 a packet transmission step of transmitting the packet compressed in said packet compression step;

15 a packet receiving step of receiving an ACK packet indicating that the reference information at the receiving side has been correctly updated or a NACK packet for requesting transmission of said update information due to a header decompression error that occurred at the receiving side;

20 a delay time measuring step of measuring a roundtrip delay time with respect to the receiving side by transmitting and receiving a packet to and from the receiving side; and

25 a mode determination step of switching the operation mode of said packet compression step to a reliable mode where, after the reference information to be referred to is updated, said update information is continuously added until the ACK packet is received, and to an optimistic mode where said update information is added when the reference information is updated and whenever

the NACK packet is received, wherein

in said mode determination step, said roundtrip delay time measured by a unit time X in said delay time measuring step is provided and, when said operation mode is the optimistic mode 30 and said roundtrip delay time is smaller than a predetermined value Y , said operation mode is switched to the reliable mode, and when said operation mode is the reliable mode and said roundtrip delay time is larger than a predetermined value Z , said operation mode is switched to the optimistic mode.

14. The header compression method according to claim 13, wherein

in said mode determination step, a rate of change in said roundtrip delay time measured by the unit time X is calculated, and the unit time X is increased when said rate of change is smaller 5 than a predetermined value A , and decreased when said rate of change is larger than a predetermined value B .

15. A header decompression method of decompressing a header of a received packet by referring to reference information that is also included in a transmitting side, said method comprising:

5 a packet receiving step of receiving the packet with update information selectively added thereto for updating said reference information stored;

10 a packet decompression step of, provided with the packet received in said packet receiving step, updating said update information by using said update information, and decompressing the header of the packet by referring to said reference information;

15 a packet transmission step of transmitting an ACK packet indicating that said reference information has been correctly updated or a NACK packet for requesting transmission of said update information when a header decompression error occurs in said packet decompression step;

20 a delay time measuring step of measuring a roundtrip delay time with respect to the transmitting side by transmitting and receiving a packet to and from the transmitting side;

25 a mode determination step of switching the operation mode of the transmitting side to a reliable mode where, after updating the reference information of the transmitting side, the transmitting side continuously adds said update information until receiving the ACK packet, and to an optimistic mode where the transmitting side adds said update information when the reference information of the transmitting side is updated and whenever receiving the NACK packet; and

30 a mode notification step of notifying the transmitting side of said operation mode selected in said mode determination step, wherein

in said mode determination step, said roundtrip delay

time measured by a unit time X in said delay time measuring step is received, and said operation mode is switched to the reliable mode when said operation mode is the optimistic mode and said roundtrip delay time is smaller than a predetermined value Y , and to the optimistic mode when said operation mode is the reliable mode and said roundtrip delay time is larger than a predetermined value Z .

16. The header decompression method according to claim 15, wherein

in said mode determination step, a rate of change in said roundtrip delay time measured by the unit time X is calculated, and the unit time X is increased when said rate of change is smaller than a predetermined value A , and decreased when said rate of change is larger than a predetermined value B .